

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A gallium nitride compound semiconductor light-emitting device comprising:

a crystalline substrate (10);

a light-emitting layer (15) of a quantum well structure that is formed of a gallium nitride compound semiconductor barrier layer doped with an impurity element and a gallium nitride compound semiconductor well layer undoped with any impurity element, said light-emitting layer being provided on a second side of the crystalline substrate;

a contact layer (17) formed of a Group III-V compound semiconductor for providing an Ohmic electrode for supplying device operation current to the light-emitting layer; and

an Ohmic electrode (18) that is provided on the contact layer and has an aperture through which a portion of the contact layer is exposed,

wherein the Ohmic electrode exhibits light permeability with respect to light emitted from the light-emitting layer, the individual well layers of the multiple quantum well structure each has the same composition and the well layer contains a thick portion having a large thickness and a thin portion having a small thickness, and a portion having a thickness of 0 nm to 1.5 nm;

wherein the barrier layer is a barrier layer which is doped with a Group IV element at an average atom density of $1 \times 10^{17} \text{ cm}^{-3}$ to $5 \times 10^{18} \text{ cm}^{-3}$ for the purpose of decreasing the forward voltage of the device, and which exhibits low resistance; and

wherein the well layer is a discontinuous layer and the light-emitting layer has a region absent a well layer ~~partially not present.~~

2-4. (canceled).

5. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the predetermined impurity element added only to the barrier layer is silicon.

6. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the contact layer (17) is doped with an n-type impurity element and has a carrier concentration of $5 \times 10^{18} \text{ cm}^{-3}$ to $2 \times 10^{19} \text{ cm}^{-3}$.

7. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the contact layer (17) is doped with a p-type impurity element and has a carrier concentration of $1 \times 10^{17} \text{ cm}^{-3}$ to $1 \times 10^{19} \text{ cm}^{-3}$.

8. (original): A gallium nitride compound semiconductor light-emitting device according to claim 7, wherein the contact layer (17) is doped with a p-type impurity element and has a carrier concentration of $1 \times 10^{17} \text{ cm}^{-3}$ to $5 \times 10^{18} \text{ cm}^{-3}$.

9. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the contact layer (17) has a thickness of 1 μm to 3 μm .

10. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the Ohmic electrode (18) exhibits a transmittance at the wavelength of emitted light of 30% or higher.

11. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the Ohmic electrode (18) has a thickness of 1 nm to 100 nm.

12. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, further comprising a metallic reflecting mirror (21) for reflecting light emitted from the light-emitting layer (15) to the outside, which mirror is provided on a first side of the crystalline substrate (10), wherein the metallic reflecting mirror (21) contains a metallic material identical to that contained in the Ohmic electrode (18).

13. (original): A gallium nitride compound semiconductor light-emitting device according to claim 12, wherein the metallic reflecting mirror (18) has a multilayer structure including a metallic film which contains a metallic material identical to that contained in the Ohmic electrode (18).

14. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the metallic reflecting mirror (21) contains a single-metal film or an alloy film formed from at least one member selected from the group consisting of silver, platinum, rhodium and aluminum.

15. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the metallic reflecting mirror (21) is in the form of multilayer film.

16. (previously presented): A light-emitting diode employing the gallium nitride compound semiconductor light-emitting device according to claim 1.

17. (previously presented): A lamp employing the gallium nitride compound semiconductor light-emitting device according to claim 1.

18. (canceled).

19. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the barrier layer is an Si-doped n-type GaN barrier layer.

20. (previously presented): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein apertures are formed such that a total surface area of the apertures accounts for 30% to 80% of a surface of the contact layer.

21. (currently amended): A gallium nitride compound semiconductor light-emitting device according to claim 1, wherein a minimum horizontal width (lateral width) of a metallic film ~~having~~constituting the Ohmic electrode is 10 μm or less, and a horizontal width of the aperture is 0.5 μm to 50 μm .

22. (currently amended): A gallium nitride compound semiconductor light-emitting device according to claim 20, wherein a minimum horizontal width (lateral width) of a metallic film ~~having~~constituting the Ohmic electrode is 10 μm or less, and a horizontal width of the aperture is 0.5 μm to 50 μm .